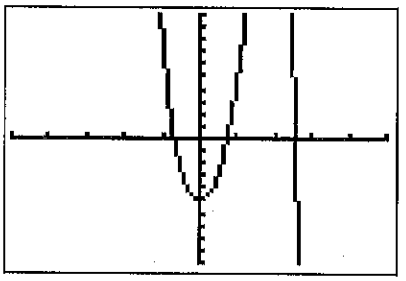
Name Key Date

291 Ch 7 Test Review

For #s 1 & 2, answer the following questions:

a. Is the function odd or even?
b. Describe the end behavior.
c. State the number of real zeros.

#1



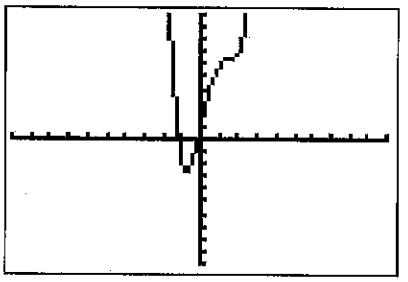
1. a. odd

b. As $x \to +\infty$, then $f(x) \to$ $-\infty$

As $x \to -\infty$, then $f(x) \to$ $+\infty$

c. 3

#2



2. a. even

b. As $x \to +\infty$, then $f(x) \to$ $+\infty$

As $x \to -\infty$, then $f(x) \to$ $+\infty$

c. 2

For #s 3 and 4, calculate the real zeros and the relative max and min.

3. $y = x^3 - 6x - 9$ Zeros 3 Max -3.343 Min -14.657

4. $y = x^4 - 3x^3 + 7x + 1$ Zeros $\{-1.211, .144\}$ Max ——— Min -2.670

Solve using quadratic techniques.

5. $x^3 - 8 = 0$

$(x-2)(x^2+2x+4) = 0$

$\frac{-2 \pm \sqrt{4-4(1)(4)}}{2}$ (−12)

$\frac{-2 \pm 2i\sqrt{3}}{2}$

$\{2, -1 \pm i\sqrt{3}\}$

6. $x^{2/3} - 9x^{1/3} + 20 = 0$

Let $u = x^{1/3}$

$u^2 - 9u + 20 = 0$

$(u-5)(u-4)$

$u = 5 \quad u = 4$

$(x^{1/3} = 5)^3 \quad (x^{1/3} = 4)^3$

$x = 125 \quad x = 64$

$\{64, 125\}$ Check ✓

7. What would be the degree of an equation with the following roots? 4

2, 4, $\sqrt{2}$ ← $\pm\sqrt{2}$ Conjugate

8. Write the equation.

2 4 $\pm\sqrt{2}$

sum 6 sum = 0

prod 8 prod = −2

$(x^2-6x+8)(x^2-2)=0$

$x^4 - 2x^2 - 6x^3 + 12x + 8x^2 - 16$

$x^4 - 6x^3 + 6x^2 + 12x - 16 = 0$

List all of the possible rational roots for the following equations, then solve completely.

9. $f(x) = x^4 + 5x^3 + 15x^2 + 19x + 8$

$p \in \{\pm1, \pm2, \pm4, \pm8\}$

$q \in \{\pm1\}$

$p/q = \{$

$x^2 + 3x + 8$

$\frac{-3 \pm \sqrt{9-4\cdot8}}{2}$

$\frac{-3 \pm i\sqrt{23}}{2}$

−1	1	5	15	19	8
		−1	−4	−11	−8
−1	1	4	11	8	0
		−1	−3	−8	
	1	3	8	0	

$\left\{-1, -1, \frac{-3 \pm i\sqrt{23}}{2}\right\}$

10. $f(x) = 2x^4 - 9x^3 + 2x^2 + 21x - 10$

$p \in \{\pm1, \pm2, \pm5, \pm10\}$

$q \in \{\pm1, \pm2\}$

$p/q \in \{\pm1, \pm\frac{1}{2}, \pm2, \pm5, \pm\frac{5}{2}, \pm10\}$

$\left\{\frac{1}{2}, 2, 1 \pm \sqrt{6}\right\}$

½	2	−9	2	21	−10
		1	−4	−1	10
2	2	−8	−2	20	0
		4	−8	20	
	2	−4	−10	0	

$2x^2 - 4x - 10 = 0$

$\frac{4 \pm \sqrt{16 - 4(2)(-10)}}{4}$

$\frac{4 \pm 4\sqrt{6}}{4}$

Given: $f(x) = x^3$ and $g(x) = x - 2$ and $h(x) = 2x^3 + 4x - 8$

11. Find $[f \circ g](x)$.

$[f \circ g](x)$

$f(x-2)$

$(x-2)^3$

$(x-2)(x^2-4x+4)$

$x^3 - 4x^2 + 4x - 2x^2 + 8x - 8$

$x^3 - 6x^2 + 12x - 8 = [f \circ g](x)$

12. Find $[g \circ f](x)$.

$g(x^3)$

$[g \circ f](x) = x^3 - 2$

Given: $f(x) = x^3$ and $g(x) = x - 2$ and $h(x) = 2x^3 + 4x - 8$

13. Find $(f + h)(x)$.

$x^3 + 2x^3 + 4x - 8$

$= 3x^3 + 4x - 8$

14. Find $(h - g)(x)$.

$2x^3 + 4x - 8 - (x - 2)$

$= 2x^3 + 3x - 6$

16. Find $(f \times h)(x)$.

$x^3(2x^3 + 4x - 8)$

$= 2x^6 + 4x^4 - 8x^3$

Given $f = \{(1,2)\ (3, 4)\ (5, 6)\ (7, 8)\}$ $g = \{(3, 5)\ (7, 4)\ (6, 2)\ (8, 1)\}$

17. Find $[f \circ g]$.

$\{(3,6)(8,2)\}$

18. Find $[g \circ f]$. $\{(5,2)(7,1)\}$

Find the inverse of the following.

19. $f(x) = \frac{1}{2}x + 6$

$y = \frac{1}{2}x + 6$

$x = \frac{1}{2}y + 6$

$x - 6 = \frac{1}{2}y$

$2x - 12 = y$

$f^{-1}(x) = 2x - 12$

20. $f(x) = \frac{2x-4}{7}$

$y = \frac{2x-4}{7}$

$x = \frac{2y-4}{7}$

$7x = 2y - 4$

$7x + 4 = 2y$

$\frac{7x+4}{2} = y$

$f^{-1}(x) = \frac{7x+4}{2}$

21. Use composition of functions to show that $f(x)$ and $f^{-1}(x)$ from #19 are in fact inverses.

$[f \circ f^{-1}](x) = x$

$\frac{1}{2}(2x - 12) + 6 = x$

$x - 6 + 6 = x$

$x = x$ ✓

$[f^{-1} \circ f](x) = x$

$2(\frac{1}{2}x + 6) - 12 = x$

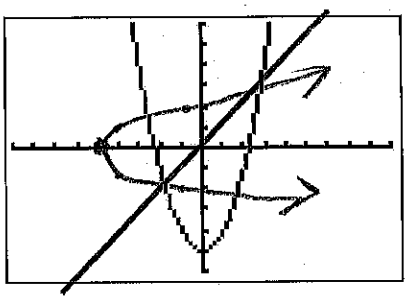
$x + 12 - 12 = x$

$x = x$ ✓

Sketch the inverse of the following.

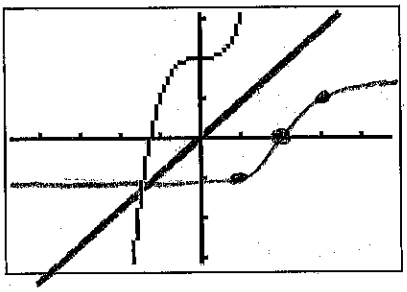
22. $y = x^2 - 5$

0,-5 → -5,0
1,-4 → -4,1
1,-4 → -4,-1
2,-1 → -1,2
2,-1 → -1,-2



23. $y = x^3 + 2$

0,2 → 2,0
1,3 → 3,1
-1,1 → 1,-1

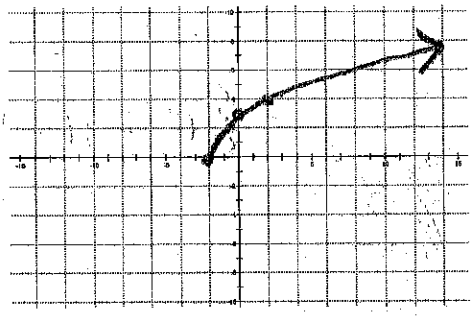


Graph the following. Use a table of values.

24. $y = \sqrt{3x + 6}$

$3x + 6 \geq 0$
$x \geq -2$

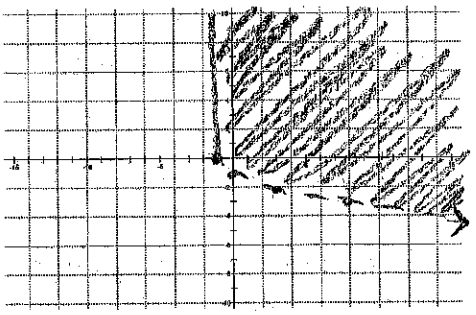
-2	0
1	3
2	$\sqrt{12}$ 3.-



25. $y > -\sqrt{x+1}$

$x + 1 \geq 0$
$x \geq -1$

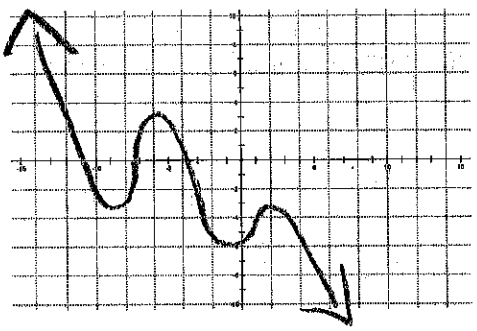
-1	0
0	-1
3	-2
8	-3



D: $x \geq -2$ R: $y \geq 0$

Sketch the graph of the following polynomials (use the maximum number of turning points).

26. An odd function with a degree of 5, a negative leading coefficient, and 2 imaginary roots



27. An even function with a degree of 6, 4 imaginary roots, and a positive leading coefficient